TRICHAPTER UNIFORM CODES PROGRAM
2001 CBC AMENDMENTMENTS AND INTERPRETATION

Proposed by Code Interpretation Committee:

Date: March 1, 2002
Item No.: 10 (previously No. 6)
Code Section: 1612.3.1

1612.3.1 Basic load combinations. Where allowable stress design (working stress design) is used, structures and all portions thereof shall resist the most critical effects resulting from the following combinations of loads:

D	(12-7)
$D + L + (L_r$ or $S)$	(12-8)
$D + (W$ or $E/1.4)$	(12-9)
$0.9D \pm E/1.4$	(12-10)
$D + 0.75 [L + (L_r$ or S) + (W or $E/1.4)]$	(12-11)

No increase in allowable stresses shall be used with these load combinations except as specifically permitted elsewhere in this code. and the duration of load increase permitted in Division III of Chapter 23.

Recommendation: Approve

Reason for amendment:

Allow consideration of duration of Load increase as explained in SEAOC Blue Book Commentary C101.7.3.1 and to be consistent with Ch 23. This is consistent with SEAOC Seismology position.

Findings (based upon local geologic, topographic or climatic conditions):

The amendment is needed due to local geological conditions.

The San Francisco Bay area region is densely populated and/or located in an area of high seismic activities as indicated by United States Geological Survey and California Division of Mines and Geology. Recent earthquake activities, including the 1989 Loma Prieta earthquake, have indicated the lack of adequate design and detailing as a contributing factor to damages that reduced the protection of the life-safety of building occupants.

Recommendations:

Use as Interpretation/Policy

Proposed by Code Interpretation Committee:

Date: March 1, 2002

Item Number: 11 (previously No. 7)
Code Section: 1612.3.2
Proposed Amendment (strikeout/underline format):

1612.3.2 Alternate basic load combinations. In lieu of the basic load combinations specified in Section 1612.3.1, structures and portions thereof shall be permitted to be designed for the most critical effects resulting from the following load combinations. When using these alternate basic load combinations, a one-third increase shall be permitted in allowable stresses for all combinations including *W* or *E*. ~~—~~but not concurrent with the duration of load increase permitted in Division III of Chapter 23.

$D + L + (L_r$ or S)	(12-12)
$D + L + (W$ or $E/1.4)$	(12-13)
$D + L + W + S/2$	(12-14)
$D + L + S + W/2$	(12-15)
$D + L + S + E/1.4$	(12-16)
$0.9D \pm E/1.4$	(12-16-1)

EXCEPTIONS: 1. Crane hook loads need not be combined with roof live load or with more than three fourths of the snow load or one half of the wind load.
2. Design snow loads of 30 psf (1.44 kN/m 2) or less need not be combined with seismic loads. Where design snow loads exceed 30 psf (1.44 kN/m 2), the design snow load shall be included with seismic loads, but may be reduced up to 75 percent where consideration of siting, configuration and load duration warrant when approved by the building official.

Recommendation: Approve

The proposal clarifies that it was not the intent of the code to allow the one-third increase for wind or earthquake to be cumulative with duration of load factors as permitted in chapter 23 of UBC, since these factors essentially represent the same allowance.

Reason for amendment:

Findings (based upon local geologic, topographic or climatic conditions):

The amendment is needed due to local geological conditions.

The San Francisco Bay area region is densely populated and/or located in an area of high seismic activities as indicated by United States Geological Survey and California Division of Mines and Geology. Recent earthquake activities, including the 1989 Loma Prieta earthquake, have indicated the lack of adequate design and detailing as a contributing factor to damages that reduced the protection of the life-safety of building occupants.

Recommendations:

Use as Interpretation/Policy

Proposed by Code Interpretation Committee:

Date: March 1, 2002

Item Number: 12 (previously No. 8)
Code Section: 1630.2.3.4
Proposed Amendment (strikeout/underline format):

1630.2.3.4 Horizontal Distribution. Diaphragms constructed of untopped steel decking or wood structural panels or similar light-frame construction are permitted to be considered as flexible.

SECTION x7. Section 1630.2.3 of the California Building Code is amended by adding Section 1630.2.3.5 to read as follows:

~~**1630.2.3.4**~~ **1630.2.3.5 Applicability.** Sections 1630.1.2, 1630.1.3, 1630.2.1, 1630.2.2, 1630.5, 1630.9, 1630.10 and 1631 shall not apply when using the simplified procedure.

EXCEPTION: For buildings with relatively flexible structural systems, the building official may require consideration of *P?* effects and drift in accordance with Sections 1630.1.3, 1630.9 and 1630.10. $?_s$ shall be prepared using design seismic forces from Section 1630.2.3.2.

Recommendation: Approve

Reason for amendment:

The proposal is compatible with the current policy adopted by the Tri-Chapter jurisdictions. The assumption of flexible diaphragm is limited only to simplified procedure which requires design for additional seismic loads.

Findings (based upon local geologic, topographic or climatic conditions):

The amendment is needed due to local geological conditions.

The San Francisco Bay area region is densely populated and/or located in an area of high seismic activities as indicated by United States Geological Survey and California Division of Mines and Geology. Recent earthquake activities, including the 1989 Loma Prieta earthquake, have indicated the lack of adequate design and detailing as a contributing factor to damages that reduced the protection of the life-safety of building occupants.

Recommendations:

Use as Interpretation/Policy

Proposed by Code Interpretation Committee:

Date: March 1, 2002

Item Number: 13 (previously No. 9)
Code Section: 1630.4.2
Proposed Amendment (strikeout/underline format):

1630.4.2 Vertical combinations. The value of *R* used in the design of any story shall be less than or equal to the value of *R* used in the given direction for the story above.

> **EXCEPTION:** This requirement need not be applied to a story where the dead weight above that story is less than 10 percent of the total dead weight of the structure.

Structures may be designed using the procedures of this section under the following conditions:
1. The entire structure is designed using the lowest *R* of the lateral-force-resisting systems used, or
2. The following two-stage static analysis procedures may be used for structures conforming to Section 1629.8.3, Item 4.

2.1 The flexible upper portion shall be designed as a separate structure, supported laterally by the rigid lower portion, using the appropriate values of *R* and ?.

2.2 The rigid lower portion shall be designed as a separate structure using the appropriate values of *R* and ?. The reactions from the upper portion shall be those determined from the analysis of the upper portion ~~amplified~~ multiplied by the ratio of the *(R/*?) of the upper portion over *(R/?*) of the lower portion. This ratio shall not be taken less than 1.0.

Recommendation: Approved

Reason for amendment:

The proposal adds language to ensure that the seismic forces are not inadvertently reduced from a higher level to a lower level due to different lateral force resisting systems along the height of the building

Findings (based upon local geologic, topographic or climatic conditions):

The amendment is needed due to local geological conditions.

The San Francisco Bay area region is densely populated and/or located in an area of high seismic activities as indicated by United States Geological Survey and California Division of Mines and Geology. Recent earthquake activities, including the 1989 Loma Prieta earthquake, have indicated the lack of adequate design and detailing as a contributing factor to damages that reduced the protection of the life-safety of building occupants.

Recommendations:

Use as Interpretation/Policy

Proposed by Code Interpretation Committee:

Date: March 1, 2002

Item Number: 14 (previously No. 10)
Code Section: 1630.7
Proposed Amendment (strikeout/underline format):

1630.7 Horizontal Torsional Moments. Provisions shall be made for the increased shears resulting from horizontal torsion where diaphragms are not flexible. The most severe load combination for each element shall be considered for design.

The torsional design moment at a given story shall be the moment resulting from eccentricities between applied design lateral forces at levels above that story and the vertical-resisting elements in that story plus an accidental torsion.

The accidental torsional moment shall be determined by assuming the mass is displaced as required by Section 1630.6.

Where torsional irregularity exists, as defined in Table 16-M, the effects shall be accounted for by increasing the accidental torsion at each level by an amplification factor, A_x , determined from the following formula:

$$A_x = \left[\frac{d_{\max}}{1.2 d_{avg}} \right]^2 \qquad (30\text{-}16)$$

WHERE:

d_{avg} = the average of the ~~displacements~~ story drift at the extreme points of the structure at Level *x*.

d_{max} = the maximum displacement story drift at Level *x*.

The value of A_x need not exceed 3.0.

~~**Exceptions:** 1. The value of A_x need not exceed 3.0.~~
~~2. The torsional and accidental torsional moment need not be amplified for structures of light-frame construction, nor for structures designed using Section 1630.2.3.~~

Recommendation: Approve as Modified

Reason for amendment:

The approved language replaces the word “displacement” with “drift”, which is more appropriate when considering amplification of the diaphragm torsional effects.

The latter part of the original proposal which would have exempted the diaphragms in light-frame construction altogether from torsional amplification, was not approved by the committee. The committee believes that another amendment (item 12) dealt with this issue by allowing such diaphragms to be considered flexible in most situations. Therefore, there is no justification for additional relaxation of diaphragm rigidity consideration.

Findings (based upon local geologic, topographic or climatic conditions):

The amendment is needed due to local geological conditions.

The San Francisco Bay area region is densely populated and/or located in an area of high seismic activities as indicated by United States Geological Survey and California Division of Mines and Geology. Recent earthquake activities, including the 1989 Loma Prieta earthquake, have indicated the lack of adequate design and detailing as a contributing factor to damages that reduced the protection of the life-safety of building occupants.

Recommendations:

Use as Interpretation/Policy

Proposed by Code Interpretation Committee:

Date: March 1, 2002

Item Number: 15 (previously No. 11)
Code Section: 1630.8.2
Proposed Amendment (strikeout/underline format):

- **1630.8.2.1 General.** Where any portion of the lateral-load-resisting system is discontinuous, such as for vertical irregularity Type 4 in Table 16-L or plan irregularity Type 4 in Table 16-M, ~~concrete, masonry, steel and wood elements~~ columns, beams, trusses or slabs supporting such discontinuous systems shall have the design strength to resist the combination loads resulting from the special seismic load combinations of Section 1612.4. *The Connections of such discontinued elements to the supporting members shall be adequate to transmit the forces for which the discontinuous elements were required to be designed.*

  EXCEPTIONS: 1. The quantity E_m in Section 1612.4 need not exceed the maximum force that can be transferred to the element by the lateral-force-resisting system.
  2. Concrete slabs supporting light-frame wood shear wall systems or light-frame steel and wood structural panel shear wall systems.

For Allowable Stress Design, the design strength may be determined using an allowable stress increase of 1.7 and a resistance factor, Φ, of 1.0. This increase shall not be combined with the one-third stress increase permitted by Section 1612.3, but may be combined with the duration of load increase permitted in Chapter 23, Division III.

Recommendation: Approve as modified

Reason for amendment:

The changes limits use of the special load combination to the primary elements of the structural frame system, thereby exempting miscellaneous components of the lateral-force resisting system (such as hold-downs) and foundations. This is consistent with intent of the Code and SEAOC Seismology Position.

The changes in italics were added by the Tri-Chapter code committee to ensure that connections of such elements to the supporting members are not designed for a load less that what the member above is designed for. For example in case of steel columns that are part of lateral force resisting system, which are designed for the special load combination, it is prudent to ensure that their connections also have sufficient capacity to transmit the load to the supporting element.

Findings (based upon local geologic, topographic or climatic conditions):

The amendment is needed due to local geological conditions.

The San Francisco Bay area region is densely populated and/or located in an area of high seismic activities as indicated by United States Geological Survey and California Division of Mines and Geology. Recent earthquake activities, including the 1989 Loma Prieta earthquake, have indicated the lack of adequate design and detailing as a contributing factor to damages that reduced the protection of the life-safety of building occupants.

Recommendations:

Use as Interpretation/Policy

Proposed by Code Interpretation Committee:

Date: March 1, 2002

Item Number: 16 (previously No. 13)
Code Section: 1633.2.4
Proposed Amendment (strikeout/underline format):

1633.2.4 Deformation compatibility. All structural framing elements and their connections, not required by design to be part of the lateral-force-resisting system, shall be designed and/or detailed to be adequate to maintain support of design dead plus live loads when subjected to the expected deformations caused by seismic forces. *PD* effects on such elements shall be considered. Expected deformations shall be determined as the greater of the Maximum Inelastic Response Displacement, *DM* , considering *PD* effects determined in accordance with Section 1630.9.2 or the deformation induced by a story drift of 0.0025 times the story height. When computing expected deformations, the stiffening effect of those elements not part of the lateral-force-resisting sys-tem shall be neglected.

For elements not part of the lateral-force-resisting system, the forces induced by the expected deformation may be considered as ultimate or factored forces. When computing the forces induced by expected deformations, the restraining effect of adjoining rigid structures and nonstructural elements shall be considered and a rational value of member and restraint stiffness shall be used. Inelastic deformations of members and connections <u>are permitted to occur</u> ~~may be considered in the evaluation~~, provided the assumed calculated capacities are consistent with member and connection design and detailing.

Recommendation: Approve

Reason for amendment:

The proposal replaces ambiguous language of “may be” with the more affirmative language of “are permitted to” which clarifies the intent and eliminates confusion in enforcing the provision.

Findings (based upon local geologic, topographic or climatic conditions):

The amendment is needed due to local geological conditions.

The San Francisco Bay area region is densely populated and/or located in an area of high seismic activities as indicated by United States Geological Survey and California Division of Mines and Geology. Recent earthquake activities, including the 1989 Loma Prieta earthquake, have indicated the lack of adequate design and detailing as a contributing factor to damages that reduced the protection of the life-safety of building occupants.

Recommendations:

Use as Interpretation/Policy

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Proposed by Code Interpretation Committee:

Date: March 1, 2002

Item Number: 17 (previously No. 14)
Code Section: 1915.2.2
Proposed Amendment (strikeout/underline format):

1915.2.2 Base area of footing or number and arrangement of piles shall be determined from the external forces and moments (transmitted by footing to soil or piles) and permissible soil pressure or permissible pile capacity selected through principles of soil mechanics. ~~*External forces and moments are those resulting from unfactored loads (D, L, W and E) specified in Chapter 16.*~~ External forces and moments are those resulting from the load combinations of Section 1612.3.

Recommendation: Approve

Reason for amendment:

The proposal corrects the existing code language for the design of footings for ASD criteria. The current language specifies unfactored loads, whereas, in ASD design there are some load factors that need to be considered.

Findings (based upon local geologic, topographic or climatic conditions):

The amendment is needed due to local geological conditions.

The San Francisco Bay area region is densely populated and/or located in an area of high seismic activities as indicated by United States Geological Survey and California Division of Mines and Geology. Recent earthquake activities, including the 1989 Loma Prieta earthquake, have indicated the lack of adequate design and detailing as a contributing factor to damages that reduced the protection of the life-safety of building occupants.

Recommendations:

Use as Interpretation/Policy

TRICHAPTER UNIFORM CODES PROGRAM
2001 CBC AMENDEMENTS AND INTERPRETATION

Proposed by Code Interpretation Committee:

Date: April 9, 2002

Item Number: 18
Code Section: 213
Proposed Amendment (strikeout/underline format):

SECTION 213: DEFINITION

213 Light-Frame Construction is a type of construction whose vertical and horizontal structural elements are primarily framed by a system of repetitive wood or light gauge steel framing members, and which does not use structural concrete as floor or roof diaphragm.

Recommendation: Approve

Reason for amendment:

THE 1997 UBC, ON SEVERAL OCCASIONS, REFERS TO "LIGHT-FRAME" CONSTRUCTION. HOWEVER, CURRENTLY THERE IS NO DEFINITION FOR THE TERM. THE PROPOSAL INSERTS NEW LANGUAGE, SIMILAR TO THE PROVIDED IN IBC, FOR ADDITIONAL CLARIFICATION.

Findings (based upon local geologic, topographic or climatic conditions):

The amendment is needed due to local geological conditions.

The San Francisco Bay area region is densely populated and/or located in an area of high seismic activities as indicated by United States Geological Survey and California Division of Mine and Geology. Recent earthquake activities, including the 1989 Loma Prieta earthquake, have indicated the lack of adequate design and detailing as a contributing factor to damages that reduced the protection of the life-safety of building occupants.

Recommendations:

Use as Interpretation/Policy